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AF DEPOT NEEDS

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JTEG MEETING

Nov 2003

WR-ALC, OC-ALC, and OO-ALC

OO-ALC #1: Advanced Non-Destructive Evaluation for Composites

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Specific Need

1. **Single station inspection of aircraft composite structures**
   - **Decreasing time to inspect due to multiple station movement**
2. **Serialized parts tracking for history**
   - **Provides data which can influence parts disposition**
   - **Defect/anomaly mapping**

Technology Assessment

1. **Hi-tech need to integrate in-situ and traditional sensor technologies**
   - **Single station technologies under spiral development**
   - **Transition technologies as available**
2. **Capability exists but needs to be integrated into single station concept**

Current Status

1. **No project plan for single station concept; some SBIR's, STTRs provide on-aircraft component inspection capabilities**
2. **WR-ALC working with Air Staff on a parts tracking system.**

Action Plan

1. **Under Consideration for FY06 POM**
2. **Monitor ALC/Air Staff activity on parts tracking system**

OO-ALC #2: Advanced Composite Replacement for Space Command, Control & Comm Shelters

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Specific Need

1. **Improve methods to maintain existing metallic tactical shelters**
   - **Environmental friendly paint/de-paint process**
2. **Alternate material shelters to reduce maintenance and meet EMI/EMC requirements**

Technology Assessment

1. **Paint/de-paint technologies exist: hi-tech primer development required**
2. **Hi-tech development maybe needed to incorporate additives to meet EMI/EMC requirements**
   - **Alternate materials exist to meet structural requirements**

Current Status

1. **No current activities**
2. **No current activities.**

Action Plan

1. **Under Consideration for FY06 POM to develop and transition primer**
2. **ASC/AFRL reviewing OO Shelter specifications and SBIR data.**
   - **Advocate POM if required**

OO-ALC #3: Insensitive Munitions (IM) explosives as alternative for TNT in general purpose bombs

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Specific Need

1. **Insensitive munitions replacement/alternative to TNT type munitions**
2. **Corrosion protection for current weapon casings**
3. **New casing designs to meet casing burst prior to detonation**

Technology Assessment

1. **Technology in development at AFRL with AAC**
2. **Fielded technology requires further development/optimization**
3. **Technology in development at AFRL with AAC**

Current Status

1. **The AFRL/AAC program is fully funded; provides solution**
2. **No current projects**
3. **The AFRL/AAC program is fully funded; provides solution**

Action Plan

1. **No Action Required**
2. **Develop technology transition plan**
3. **No Action Required**

OO-ALC #4: Process to Convert Present Simulators to State-of-the-Art Systems

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Specific Need

1. **Process/capability to re-host legacy software onto emerging state-of-the-art computer systems**

Technology Assessment

1. **No One-Size-Fits-All solution exists. Sometimes existing technologies can be used with very skilled people, sometimes S&T is required.**

Current Status

1. **AFRL/HE has a group of experts that can be accessed for this need; in some cases can be used as an alternate source for work. The team currently supports the A-10 and F-16 in this manner through OO's A/OA-10 Full Mission Trainer IPT**

Action Plan

1. **ASC/AFRL will engage with OO-ALC to determine if existing IPT successes can be developed into a process for general application.**

OO-ALC #5: Develop High Speed 1553 Data Bus for Aircraft LRU Data Exchange

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Specific Need

1. Increase bandwidth on legacy 1553 data bus

Technology Assessment

1. Transitional development required
   - Concept validation underway to increase bandwidth

Current Status

1. AFRL/ASC has on-going project with Dual Use and 6.5 funding in FY03-04

Action Plan

1. No further action required

OC-ALC #1: Structural Component Smart Coatings - Engines

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Specific Need

1. Capability to measure/monitor health of critical engine components
2. Prognostic analysis tools to reliably predict remaining life and pending failures
3. Proactive health management using life model in engine control software

Current Status

1. 3 ATD's on-going provide partial solutions
2. No current activity
3. No current activity

Technology Assessment

1. Hi-tech development still required due to harsh environment
   - Spiral technologies transition when available

2, 3 Hi-tech challenges: detailed S&T roadmaps developed
   - Spiral technologies transition when available

Action Plan

1, 2, 3 Additional supporting activities under consideration for FY06 POM
   - Follow-on transition plans need developed

OC-ALC #2: Enabling Technologies for Migration of Shop Floor IT

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Specific Need

1. Efficient process/capability to migrate software to state-of-the-art computer platforms
   - Documentation updates to reflect migration changes
2. Portable/rugged data portal for input and output of aircraft Tech Data and on the spot maintenance information and documentation

Technology Assessment

1. Technology pieces exist: Integration required
2. Integrated Technical Information for the Air Logistics Center (IT-ALC) Program developed by AFRL in 90's: transition required
   - Initial communication with ALC indicates that IT-ALC will satisfy the need

Current Status

1. No current activities
2. No current activities

Action Plan

1. ASC/AFRL to assess current systems and assist OC-ALC in developing an implementation plan
2. ASC/AFRL evaluating current options for future transition

OC-ALC #3: Radome Damage & Repair System

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Specific Need

1. Develop integrated work station to inspect, repair, and test aircraft radomes.
   - Develop high-speed, high-accuracy, non-contact dimensional/form measuring system capable of measuring both outside and inside surfaces of all AF inventory radome (largest B-52 nose dome).
   - Develop air coupled, non-contact, high-accuracy, high speed NDE system to rapidly locate all forms of dome defects (general location of defect including depth).
   - Enhance high speed, contact NDE system to provide rapid specific location of defects.
   - Integrate above subsystems into a high accuracy, dustless ultrasonic cutting station and develop decision making software for standard repair cuts. System shall also be capable of cutting exact plug for repair patch from prepreg layup. Customize a data base for historical finger printing of AF domes, graphically showing accurate location and history of all repairs.
   - Enhance high speed automatic tool changers for the above system and sub-systems.
2. Develop new method of throughput transmission for testing repaired dome and correlate with Far Field Range testing results (i.e., replace the need for costly Far Field or Compact Range testing)

Current Status

1. No project plan
2. No project plan

Technology Assessment

1. Individual technologies exist however significant integration effort required to incorporate into single unit
2. Hi-tech challenge significant S&T development required

Action Plan

1. Under Consideration for FY06 POM
2. Draft and submit SBIR topic
   - Spiral technology transition when available

OC-ALC #4: Rapid Fuel Tank Leak Detection

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Specific Need

1. Capability/process to pinpoint fuel leaks in multilayer bladders and integral fuel tanks
2. Capability/process to repair bladder leaks without removal

Current Status

1, 2 No current S&T activities

1, 2 ASC assessing fuel systems issues and developing fuel system strategy - 6.5 funding in FY02

Technology Assessment

1. Detection and Repair Technologies require further S&T development
   - Helium Detection (85% mature)
   - Heat Transfer Detection (50% mature)
   - Fill and Drain Repair (70% mature)
   - Quick Patch Repair (25% mature)
2. Same as (1) above

Action Plan

1, 2 Under Consideration for FY06 POM

OC-ALC #5: Generic Circuit Card Assembly

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Specific Need

1. Need a smart card, programmable card with multiple functions.

Technology Assessment

1. Technologies exist which use capability and Input/Output specifications to emulate obsolete circuit cards

Current Status

1. No project plan

Action Plan

1. ASC work with ALC's to identify existing technologies
   - Develop with ALC transition requirements

WR Need #1: Continued Advanced/Improvements of NDI/Quantification Technologies

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Specific Need

1. Automate/Improve NDI (–36 handbook) Tech Order procedures to reduce PDM flow times/costs for C-130, C-5 and F-15 aircraft
2. Capability to detect and categorize fluid in honeycomb structures
3. Portable, miniature residual stress measurement system

Technology Assessment

1. Hi-tech development may be required for specific "deep" geometries
   - Technology may be available for transition for specific geometries with software and/or hardware optimization
2. Lab capability exists, fieldable capability requires transitional development for thermography software packages
3. Some hi-tech development and some transition available depending on specifics

Current Status

1. ATD deliverable (E) in FY05 with transition in 6.5 baseline FY06-07
2. No current activities
3. No current activities

Action Plan

1. Work with WR-ALC to understand application of current and emerging technologies to component specific application
2. Work with WR & OC ALC vendors to define STTR program. Advocate FY06 POM
3. Under Consideration for FY06 POM

WR Need #2: Advancement/Improvement of Structural Repair/Replacement Technologies

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Specific Need

1. Repair methodology for bonded composite doublers and other repair options for C-5, C-141, and C-130 fuselages in difficult areas with respect to construction, shape, loads, and ease of installation
2. Bonded Composite Repair – Repair Patch Optimization
   - Test pre-cured, co-cured, and cold bond paste adhesive bonded repairs to compare fatigue and static strength
   - Acceptable disbond limits for structural integrity
3. Honeycomb Floor Panel Redesign
4. Intelligent Near Net-shape Manufacturing Cell
5. On-Demand Near Net-shape Manufacturing

Technology Assessment

1. Bonded repair capability needs to be extended to complex, built-up wing & fuselage structure
   - Develop transition plans for individual applications
2. a) S&T required for advanced adhesives
   b) AAA and AFRL to assess comparative disbond data for weapon system applicability
   - Develop matrix
   - Develop analysis tool
3. TBD
4. TBD
5. TBD

Current Status

1. Graduated ATD --- Transition Complete at end of FY05; No current transition plans with C-5, C-141 and C-130 SPOs
2. 6.3 ATD Program Funded FY03-FY06, Transition FY06-08
3. No current plan
4. No current plan?
5. No current plan?

Action Plan

1. ASC will work with SPOs to develop transition plans
2. Develop S&T and Transition plans; Under Consideration for FY06 POM
3. TBD; Evaluate comparative disbond data for future transition options
4. TBD
5. TBD

WR Need #3: Continued Advancement/Improvement of Subsystem Technologies

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Specific Need

1. Capability to inspect in-place wiring
2. Capability to mitigate parts obsolescence in automated test systems
3. Capability to develop software in a secure network environment

Technology Assessment

1. AFMC Cat I ATD currently working on transition to F-16
2. Technology exists, some transitional development required for specific applications
3. Technology exists, may require minimal transition development

Current Status

1, 2, 3 No current activities

Action Plan

1. ASC develop transition plan for other ALC's

2, 3 ASC/AFRL need to work with ALC's to develop transition plan

- Under Consideration for FY06 POM

WR Need #4: Advancement/Improvement of Corrosion Prevention Technologies

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Specific Need

1. Capability to detect and quantify corrosion for field-level inspections

Technology Assessment

1. Hi-tech need to integrate in-situ and traditional sensor technologies
   - Single station technologies under spiral development
   - Transition technologies as available

Current Status

1. No project plan for single station concept
   - Some SBIR's, STTRs provide on-aircraft component inspection capabilities

Action Plan

1. Under Consideration for FY06 POM

WR Need #5: Advancement/Improvement of Analytical/Predictive Tool

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Specific Need

1. Develop a Platform-independent, OEM-hosted, Web-accessible, Multiple Weapons Systems Structural and DTA and Database Capability
   - Capability to assess the effects of corrosion on fatigue life
   - Stress intensities at cracks under composite doublers
   - Ability to download/upload database NDI results and repair information
2. Integrate Probabilistic Risk Assessment Tool (Update PROF) with OEM-hosted NDI databases and modify to include additional distribution functions
3. Develop Damped composite patches for sonic fatigue avoidance
   - Combined environments / loading sources / temperature effects
   - Design and analysis methods and guidance

Technology Assessment

1. Significant S&T required to provide the necessary structural analysis, NDI capability data management and mining tools, and M&P data development (failure modes and rates) to support extension of predictive capability across platforms, additional and emerging structural materials and processes.
1. Continuing transition effort will be required to support integration and transition of additional S&T capabilities
2. Some S&T required to provide needed distribution functions, increase number of variables that can be assessed concurrently
2. Risk assessment methodologies exist that can be transitioned to augment current limited probability of failure assessment capability, NDI formatting/open architecture requirements must be addressed
3. Need to develop sonic fatigue avoidance/repair guidelines and low cost patch/adhesive/damping system
3. Need to evaluate constrained layer damping treatments and provide design guideline.

Current Status

1. Some funded programs in NDI, unfunded requirements in balance of technology areas

1. Transition funded in 6.5 baseline FY01-11

2. 6.3 funded effort for Stress Intensities in FY03-04, POM wedge FY06-11

2. 6.5 funded effort for FY-03-04, POM baseline FY06-11

3. No current activities

Action Plan

1, 2, 3 Under Consideration for FY06 POM

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Criteria Considerations

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- AF Strategic Plan Core Competencies
  - Aerospace Superiority
  - Information Superiority
  - Global Attack
  - Precision Engagement
  - Rapid Global Mobility
  - Agile Combat Support
- CONOPS capabilities
- Use some existing center criteria
- Factor in existing center score
- Adopt military promotions ranking process